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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,137	09/19/2001	Kazushi Nomura	35.C15809	8430

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER
MACCHIAROLO, PETER J

ART UNIT	PAPER NUMBER
2875	

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	09/955,137	NOMURA, KAZUSHI	
	Examiner	Art Unit	
	Peter J Macchiarolo	2875	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *08 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 16-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-10 and 16-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The reply filed on May 8, 2003 consists of changes to the claims, and further, the reply consists of remarks related to the prior rejection of claims in the First Office Action. However, claims 1-10 and 16-25 are not allowable as explained below.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on May 7, 2003 is being considered by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawate et al (USPN 5,770,918; "Kawate").

5. In regards to claim **1**, Kawate discloses in figure 2, an electron-emitting apparatus comprising a first electrode (2), a second electrode (3) that is provided so as to be insulated from the first electrode, and an electron emitting film (5) electrically connected to the second electrode via the electroconductive thin film (4). Kawate further discloses in figure 8 that an anode (85) is provided at a predetermined distance from an electron-emitting device (74) according to an embodiment of the invention, such as the device disclosed in figure 2. Therefore, it can be seen that Kawate shows the electron-emitting film (5), the first electrode (2), and the second electrode (3) of figure 2 all oppose the anode (85) of figure 8, and further, that the anode is provided at a predetermined distance from the electron-emitting film. Kawate further shows that the distance between the anode and the electron emitting film is longer than a distance between the anode and the second electrode, and a distance between the anode and the first electrode is longer than the distance between the anode and the electron-emitting film.

6. In regards to claims **6-9**, Kawate discloses all of the recited limitations of claim 1 (above).

7. Kawate discloses that the electron-emitting film includes graphite.[1] Kawate further discloses in figure 8, the electron source is formed by arranging a plurality of electron-emitting apparatuses (74), and emits electrons from at least on of the plurality of electron-emitting apparatuses according to an input signal, with an image forming member (83) on which an image is formed by irradiation with electrons emitted from the electron source.

[1] Kawate, column 10, lines 18-25.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawate in view of Iwase et al. (USPN 6,135,839; "Iwase").

9. In regards to claims **2-5**, Kawate teaches all of the recited limitations of claim 1 (above).

10. Kawate is silent to a specific first and second voltage applying means for applying, to the anode, a specific voltage.

11. However, Iwase teaches in figure 10, that electrons are emitted from the electron emitting film, and that a first voltage potential is applied to the anode is equal to or higher than a voltage potential applied to the first electrode and the second electrode, and this configuration improves emission efficiency. Iwase further teaches there is a second voltage potential applied between the first electrode and the second electrode, and if a voltage potential applied to the first electrode is below a potential to the second electrode, no electrons will be emitted, and this configuration allows a user to properly control the electron emitter[2].

12. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting apparatus of Kawate, including Iwase's voltage applying means, since Iwase teaches this configuration improves emission efficiency and improves emission efficiency while allowing a user to properly control the electron emitter.

13. Claims 10, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al (USPN 5,185,554; "Nomura") in view of Xu et al. (USPN 5,973,444; "Xu").

14. In regards to claims **10, 18, and 19**, Nomura discloses in figures 4d and 4e, a first electrode (32) arranged on a surface of a substrate (31), an insulating layer (33) arranged on the first electrode, a second electrode (35) arranged on the insulating layer, and an electron emitting film (39) which consists of an organic palladium compound electron emitter[3] being arranged on the second electrode, and the second electrode has two side surfaces that oppose each other in a direction substantially parallel to the surface of the substrate and arranged so as to be shifted to be close to one of the two side surfaces. Nomura further discloses in figures 8 and 11, an electron source in which are arranged a plurality of electron-emitting devices, and an image display apparatus having a phosphor (9).

15. Nomura is silent to the electron-emitting film being comprised of fibers including carbon as a main ingredient, and each fiber includes graphenes stacked along an axial direction of the fiber. The Examiner notes that Applicant has summarized that these particular emitters are known as "multi-walled nanotubes.[4]"

16. However, Xu teaches in figure 1 that an electron field emission device (10) may have carbon fiber emitters (20) arranged on an electrode (14) to improve emission characteristics, and that these carbon fiber emitters include multiple-walled tubular structures that preferably have an average diameter from about 20 nm to about 200nm[5]. Xu further teaches these carbon fibers have many advantages over typical electron emitters, for instance, the fibers are more stable than

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[2] Iwase, column 11 lines 58-65.
[3] Nomura, column 9 lines 47-62.
[4] Specification, page 22, lines 15-18.
[5] Xu, column 9, lines 40-57.

the previous structures and do not contaminate easily under normal working conditions, the carbon structures have a low work function allowing electron emission in low electric fields, and carbon fibers are more robust[6]. Although Xu does not expressly label the emitters as "multi-walled nanotubes," one of ordinary skill in the art will recognize Xu's carbon fiber emitters to be multi-walled nanotubes, since Xu discloses the emitters are multiple-walled tubular structures having an average diameter from about 20nm to about 200nm.

17. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting device of Nomura, including the electron-emitting film being comprised of fibers including carbon as a main ingredient, and each fiber includes graphenes stacked along an axial direction of the fiber (i.e. "multi-walled nanotubes), since one of ordinary skill in the art will recognize Xu's "carbon fibers" are actually "multi-walled nanotubes" and that these emitters have many advantages over typical electron emitters.

18. Claims 16, 17, and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura in view of Xu in further view of Iwase.

19. In regards to claims **20 and 22-25**, Nomura discloses in figures 4d and 4e, a first electrode (32) arranged on a surface of a substrate (31), an insulating layer (33) arranged on the first electrode, a second electrode (35) arranged on the insulating layer, and an electron emitting film (39) which consists of an organic palladium compound electron emitter being arranged on the second electrode. Nomura further discloses the electron-emitting device emits electrons from

[6] Xu, column 2 lines 22-28.

at least one of the plurality of electron-emitting apparatuses according to an input signal to an image forming member on which an image is formed.[7]

20. Nomura is silent to the electron-emitting film being comprised of fibers including carbon as a main ingredient, and each fiber includes graphenes stacked along an axial direction of the fiber. The Examiner notes that Applicant has summarized that these particular emitters are known as "multi-walled nanotubes.[8]"

21. However, Xu teaches in figure 1 that an electron field emission device (10) may have carbon fiber emitters (20) arranged on an electrode (14) to improve emission characteristics. Xu further teaches that these carbon fiber emitters include multiple-walled tubular structures that preferably have an average diameter from about 20 nm to about 200nm.[9] Xu further teaches these carbon fibers have many advantages over typical electron emitters, for instance, the fibers are more stable than the previous structures and do not contaminate easily under normal working conditions, the structures have a low work function allowing electron emission in low electric fields, and carbon fibers are more robust[10]. Although Xu does not expressly label the emitters as "multi-walled nanotubes," one of ordinary skill in the art will recognize Xu's carbon fiber emitters to be multi-walled nanotubes, since Xu discloses the emitters are multiple-walled tubular structures having an average diameter from about 20nm to about 200nm.

22. Further, although Nomura and Xu are both silent to the exact configuration of the power sources for applying the necessary electric fields, having an electron emitting apparatus with an anode disposed at a distance from the film, the first electrode, the insulating layer, the second

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[7] Nomura, column 1, lines 42-53.
[8] Specification, page 22, lines 15-18.
[9] Xu, column 9, lines 40-57.
[10] Xu, column 2 lines 22-28.

electrode and the substrate; and a first power source for applying a necessary electric field, to cause an electron emission from the fibers, between the anode and a cathode; and a second power source for applying a necessary electric field, to stop the electron emission from the fibers, between the first electrode and the second electrode is an obvious configuration for an operable electron emitting apparatus as evidenced by Iwase in figures 10 and 29.

23. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting device of Nomura, including the electron-emitting film being comprised of fibers including carbon as a main ingredient, and each fiber includes graphenes stacked along an axial direction of the fiber (i.e. "multi-walled nanotubes) and having Applicant's recited power source and anode configuration, since one of ordinary skill in the art will recognize Xu's "carbon fibers" are actually "multi-walled nanotubes" and that these emitters have many advantages over typical electron emitters. Furthermore, Iwase teaches that having an anode and a first and second power source as recited by Applicant is an obvious configuration for an operable electron emitting apparatus.

24. In regards to claims **16, 17, and 21**, Nomura and Xu teach all of the recited limitations of claim 10 (above).

25. Both Nomura and Xu are silent to a specific first and second voltage applying means for applying, to the anode, a specific voltage.

26. However, Iwase teaches in figure 10, that electrons are emitted from the electron emitting film, and that a first voltage potential is applied to the anode is equal to or higher than a voltage potential applied to the first electrode and the second electrode, and this configuration improves

emission efficiency. Iwase further teaches there is a second voltage potential applied between the first electrode and the second electrode, and if a voltage potential applied to the first electrode is below a potential to the second electrode, no electrons will be emitted, and this configuration allows a user to properly control the electron emitter[11].

27. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting apparatus of Nomura with the emitters of Xu, including Iwase's voltage applying means, since Iwase teaches this configuration improves emission efficiency and improves emission efficiency while allowing a user to properly control the electron emitter.

Response to Arguments

28. Applicant's arguments with respect to claims 1-10, and 16-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

30. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

[11] Iwase, column 11 lines 58-65.

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (703) 305-7198. The examiner can normally be reached on 7.30 - 4:30, M-F.

32. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703) 305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

33. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

pjm
July 30, 2003

Sandra O'Shea
Supervisory Patent Examiner
Technology Center 2800